J. Appl. Cryst. (1989). **22**, 76

A three-dimensional space-group model

In order to build a model of the structure of silver nitrate (Lindley & Woodward, 1966; Bretherton & Kennard, 1969), undergraduate students need to have an understanding of the various symmetry operators (glide planes, screw axes, centres of inversion) in *Pbca*. It is useful, for teaching purposes, to illustrate three-dimensionally any orthorhombic space group. In order to do this, a black acrylic cube has been constructed with two clear faces (Fig. 1). For universal use, this

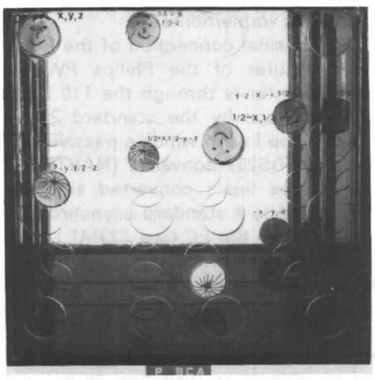

Fig. 1. Three-dimensional model for space group *Pbca*.

cube has four equally spaced clear shelves at heights $(z, \frac{1}{2}-z, \frac{1}{2}+z, 1-z)$. Each shelf has sixteen circular holes at combinations of $(x, \frac{1}{2}-x, \frac{1}{2}+x, 1-x)$ and $(y, \frac{1}{2}-y, \frac{1}{2}+y, 1-y)$. *Pbca* is easily illustrated with this cube. Asymmetric face inserts, made by photocopying figures from Luger's (1980) book, have been glued together, stiffened with plastic and cut out like a button. This is then inserted at an appropriate position in the shelf. To customize the cube for *Pbca*, the inserts have been glued into position and labelled. For simplicity, plain shelves without the holes could easily have been used instead.

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Crystallographers

This section is intended to be a series of short paragraphs dealing with the activities of crystallographers, such as their changes of position, promotions, assumption of significant new duties, honours, etc. Items for inclusion, subject to the approval of the Editorial Board, should be sent to the Executive Secretary of the International Union of Crystallography (J. N. King, International Union of Crystallography, 5 Abbey Square, Chester CH1 2HU, England).

J. Appl. Cryst. (1989). **22**, 76–77

J. V. Sanders 1924–1987

The world of crystallography has been greatly diminished by the untimely death, on 3 December 1987, of John Veysey Sanders.

John Sanders was born in Adelaide in 1924 and attended school and university in that city, graduating with honours in physics in 1947. He started his long and distinguished career in research as a CSIR student, working in Cambridge, England, in the Laboratory of the Physics and Chemistry of Rubbing Solids which, at that time, was directed by Dr Philip Bowden. John's work on the application of the methods of electron diffraction to surface layers on metals led to the award of a PhD by the University of Cambridge in 1949. Even at this early stage the distinctive Sanders style can be detected in the directness of the approach and the clarity of the analysis.

On his return to Australia in 1950 he joined the Division of Tribophysics and established in those laboratories the techniques of electron diffraction and, later, electron microscopy.

In his characteristically calm and self-effacing way he set about the development of those experimental methods which have contributed so significantly to our knowledge of the microstructure of surfaces and, in particular, to the understanding of the growth of metallic films on solid substrates. It was this work which brought the first international recognition of the originality of his approach and, indeed, many of the results on, for instance, step densities and metallic clusters have passed into the scientific canon. He continued to contribute to this field for the rest of his life, but such was the breadth of his interests and the depth of his understanding that his work on high-resolution electron microscopy and, in particular, on lattice imaging, would be regarded by many scientists as of even greater significance. His paper with John Allpress and David Wadsley on this topic is certainly classic. It effectively opens up a new and highly significant area of crystallographic inquiry, and the succession of papers which follow extend the range of application and consolidate the technique. It is a simple statement of fact that a handful of people in Melbourne changed the course of inorganic chemistry significantly in this period, and that John and David were pivotal in this move.

In later years John was to use lattice imaging in a great variety of investigations ranging over much of solid-state chemistry, but perhaps the most sustained and notable were those concerned with the constitution and catalytic activity of the zeolites. This incisive and elegant work is known throughout the scientific world and John was in great demand to lecture on this topic. He, in fact, gave generously of his time to do this and the vividness of his talks comes readily to the minds of those fortunate enough to have attended them.

It was on the structure of one of the zeolites that John was working the day before his death.

All of this might well be thought more than sufficient to fill the working life of a scientist even of John's high ability, but throughout most of his career John pursued yet another line of inquiry, namely the origins of diffraction colour in nature. His main purpose was to unravel the processes that generate colour in gem opal. In this he succeeded in the broadest sense and, further, conveyed his discoveries far outside the scientific community. Gemmologists, miners, prospectors and many members of the lay public found themselves at first entertained and then informed by John's vivid exposition. A range of people who are unaware of catalysis and lattices value John's contributions to knowledge derived from the apparently simple observation of accessible material. This has long been a touchstone for the distinguished scientist.

This simplicity of course conceals depth, and no aspiring crystallographer should miss the opportunity of studying in detail John's work on opal. In particular, his papers in *Acta Crystallographica* on his opalimeter and its use in the analysis of stacking faulting, illustrated with colour photographs of his wife Gloria's ring, are in the tradition set by Faraday and Huxley.

In all of these activities John exhibited qualities which might serve as a model, perhaps particularly in these times. First, he pursued science, not power and not status, and he pursued it by individual effort. He was a fine administrator and was in demand for this purpose, but he was never deflected from research. He quickly disposed of his organizational duties and later in the day was to be found in the laboratory.

Secondly, he brought a total honesty to his scientific work, claiming only what he had established beyond doubt and, quite oblivious of any considerations of competition, worked calmly towards quantitative understanding.

Finally, he possessed an enviable detachment and humour that endowed

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his work with a balance and scale, and made collaboration a continuing source of enjoyment.

With such a record John was the subject of many marks of distinction, the listing of which would have been a source of distaste and embarrassment to him but one, at least, must be mentioned, namely his election to the Fellowship of the Australian Academy of Sciences in 1980.

I count it as one of the greatest privileges in my life to have collaborated with John Sanders, a fine scientist and the most unassuming of men, deeply appreciative of the arts and bringing elegance, as well as incisiveness, to the sciences.

A. F. MOODIE

Dr **P. M. Colman**, CSIRO Division of Protein Chemistry, Melbourne, Australia, has been awarded the 1988 Lemberg Medal of the Australian Biochemical Society for his work on influenza viruses. Dr Colman is also the President of the Society of Crystallographers in Australia.

Professor **L. F. Dahl**, Chemistry Department, University of Wisconsin, Madison, Wisconsin, USA, Professor **H. A. Hauptman**, President of the Medical Foundation of Buffalo, Buffalo, New York, USA, and Professor **J. Kraut**, Chemistry Department, University of California, San Diego, La Jolla, California, USA, were elected Members of the US National Academy of Sciences on 26 April 1988.

On the same date, Professor **J. D. Dunitz**, Laboratorium für Organische Chemie, ETH-Zentrum, Zürich, Switzerland, was elected a Foreign Associate of the US National Academy of Sciences.

Dr **J. Deisenhofer**, Howard Hughes Medical Institute, Dallas, Texas, USA, Professor **R. Huber**, Max-Planck-Institut für Biochemie, Martinsried, Federal Republic of Germany, and Dr **H. Michel**, Max-Planck-Institut für Biophysik, Frankfurt/Main, Federal Republic of Germany, have jointly been awarded the 1988 Nobel Prize for Chemistry by The Royal Swedish Academy of Sciences for their work on the determination of the three-dimensional structure of a photosynthetic reaction centre.

They were the first to succeed in unravelling the full details of how a membrane-bound protein is built up, revealing the structure of the molecule atom by atom. The protein is taken from a bacterium which, like green plants and algae, uses light energy from the Sun to build organic substances. All our nourishment has its origin in this process, which is called photosynthesis and which is a condition for all life on earth.

The organic substances serve as nourishment for both plants and animals. Using the oxygen in the air, they consume these nutrients through what is termed cellular respiration. The conversion of energy in photosynthesis and cellular respiration takes place through transport of electrons *via* a series of proteins, which are bound in special membranes. These membrane-bound proteins are difficult to obtain in a crystalline form that makes it possible to determine their structure, but in 1982 Hartmut Michel succeeded in doing this. Determination of the structure was then carried out in collaboration with Johann Deisenhofer and Robert Huber between 1982 and 1985.

Photosynthesis in bacteria is simpler than in algae and higher plants, but the work now rewarded has led to increased understanding of photosynthesis in these organisms as well. Broader insights have also been achieved into the problem of how electrons can, at an enormously high speed, be transferred in biological systems.

International Union of Crystallography

J. Appl. Cryst. (1989). **22**, 77

Report on the IUCr Logo Design Contest

A total of 165 designs sent in by 68 entrants from 21 different countries (see Table 1) were received by the IUCr Logo Committee as entries for the Logo Design Contest [*J. Appl. Cryst.* (1988). **21**, 209–210]. The Committee reached the final conclusion on Sunday 28 August 1988 in Vienna, prior to the Eleventh European Crystallographic Meeting. The sealed envelope containing the name of the winner was opened in the presence of the President of the IUCr, Professor M. Nardelli, and another member of the Executive Committee, Dr E. N. Maslen. The winning entry was designed by

Professor Giovanni Predieri
Istituto di Chimica Generale
ed Inorganica
Università di Parma
Italy

and

Mrs Susanna Ciribolla
Centro Grafico
Università di Parma
Italy.

The final design of the IUCr logo will be published in the Union's journals after some small adjustments have been made to the winning submission.

Table 1. *Entrants to logo competition*

Country	Number of entrants	Number of entries
China PR	1	1
Czechoslovakia	2	7
Denmark	1	3
France	1	3
Germany DR	3	9
Germany FR	1	1
Hungary	7	18
Iran	1	3
Israel	1	2
Italy	7	18
Mexico	1	2
Netherlands	4	8
Philippines	1	3
Poland	7	19
South Africa	1	2
Spain	1	1
Sweden	2	6
Switzerland	4	7
UK	8	23
USA	13	28
Yugoslavia	1	1
	68	165

Notes and News

Announcements and other items of crystallographic interest will be published under this heading at the discretion of the Editorial Board. The notes (in duplicate) should be sent to the Executive Secretary of the International Union of Crystallography (J. N. King, International Union of Crystallography, 5 Abbey Square, Chester CH1 2HU, England).

J. Appl. Cryst. (1989). **22**, 77–78

European Microbeam Analysis Society

The European Microbeam Analysis Society (E-MAS) was founded in 1987 as a scientific society focusing on ultrastructural analysis methodology, with primary interests in education, communication and innovation. The Society summarizes its aims and scope as follows:

The Society has been founded to meet the growing need and demands of microbeam analysis users and scientists for further education, communication and counselling. The Society is independent but wants to cooperate in a synergic way with national groups and European societies with related interests. The Society applies to scientists and technicians active in the development and application of microbeam analysis techniques and equipment. The activities of the Society should promote this branch of science and stimulate technical and scientific developments on a European scale. In order to achieve these goals the Society will be active in the development and operation of technical and scientific education programs. Further the Society will stimulate communication and cooperation between scientists and will try to act as a counselling agent for its